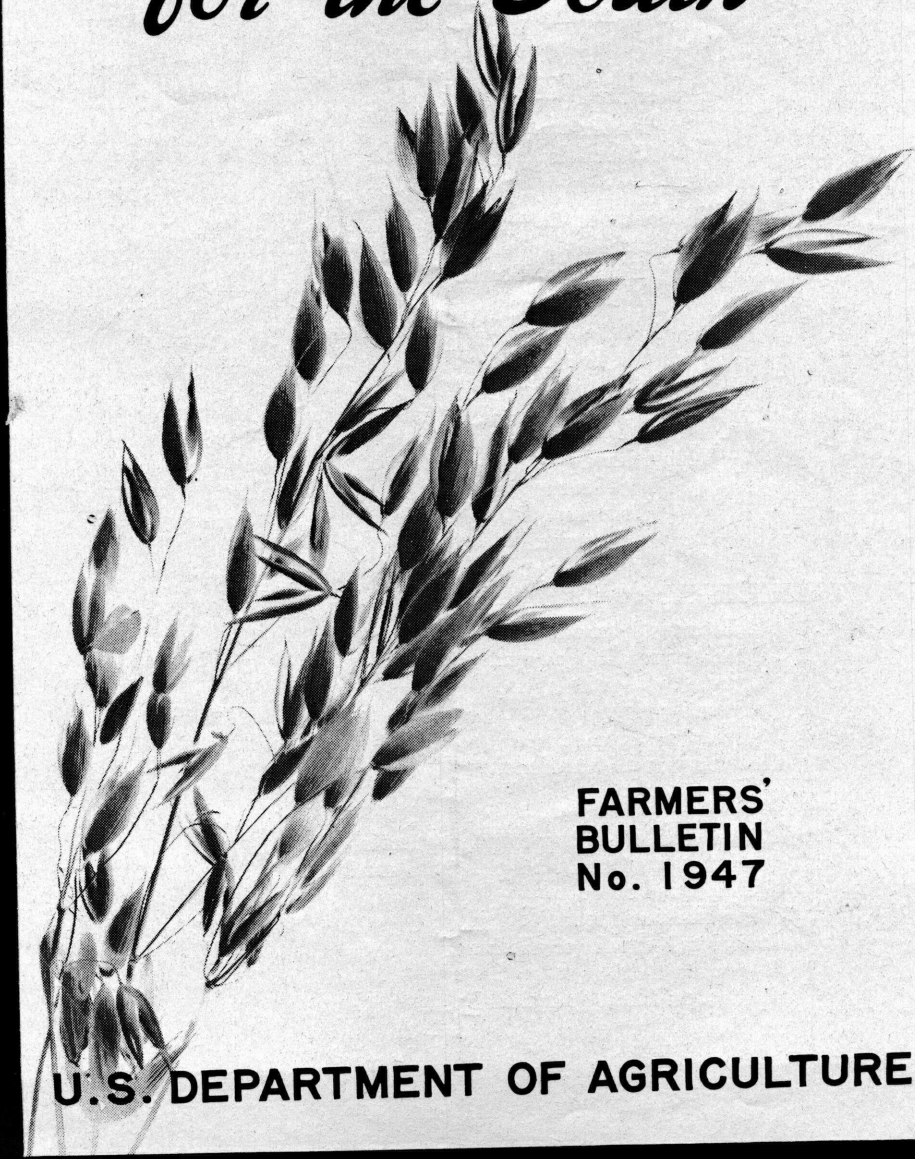
DISEASE-RESISTANT AND HARDY OATS *for the South*



FARMERS' BULLETIN
No. 1947

U.S. DEPARTMENT OF AGRICULTURE

DISEASE-RESISTANT AND HARDY OATS—

Produce More and Better Grain
Make a More Certain Crop

Common Winter Oats:

Disease-resistant—
DeSoto
Lega
Lelina
Letoria
Stanton (Strain 1)

Winter hardy—
Pioneer
Wintok

Red Oats:

Disease-resistant—
Camellia
Fulgrain (Strain 4)
Fultex
Quincy 1
Quincy 2
Ranger
Rustler
Victorgrain

Winter hardy—
Forkedeer
Fulwin
Tennex

ADVANTAGES:

Resistance to crown rust and smut.
Superior yielding power.
High-test weight.
Early maturity.
Lodging resistance.
Greater winter hardiness.

GOOD PRACTICES:

Include soil-building crops in rotations.
Sow early on firm, well-prepared seedbed.
Use certified seed.
Clean and treat seed.
Sow 8 to 10 pecks to the acre.
Sow with drill.
Apply fertilizers judiciously.

Issued October 1943

DISEASE-RESISTANT AND HARDY OATS FOR THE SOUTH

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Contents

MORE OATS NEEDED IN THE SOUTH

WAR PROGRAMS call for increasing production of oats and other feed grains in the South to support local livestock industries and insure satisfactory diets from meat, dairy, and poultry products. The high thiamine (vitamin B_1) content of oats contributes materially to their value for food and feed. Furthermore, the military and lend-lease demands for food and the congested transportation facilities make it imperative that the South become more self-sustaining through greater diversification of its agriculture.

Winter oats afford one of the most satisfactory grain, hay, winter cover, and pasture crops for the entire South. This is especially true since new disease-resistant and generally more valuable varieties have become available. Moreover, fall-sown oats greatly outyield spring-sown oats in most sections of the South. The Arkansas Agricultural Experiment Station, at Fayetteville, for example, reported that the difference in average yield of the five highest yielding fall-sown varieties, 17 bushels an acre for 21 years, was 42 percent higher than that of the five highest yielding spring-sown varieties.

THE SOUTHERN OAT REGION

The southern oat region may be divided conveniently into two general areas: (1) The winter red oat area, which coincides very closely with the Cotton Belt proper; and (2) the common winter oat area immediately to the north.

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LIMITING FACTORS IN SOUTHERN WINTER OAT PRODUCTION

Disease and winter-killing have hindered the expansion of fall-sown oat production in the South. Throughout the Gulf coast region the chief limiting factor has been crown rust, which occurs there nearly every year, and in the area immediately to the north it frequently reduces the yield and quality of oats. In general, crown rust is more prevalent and destructive than stem rust; however, the stem rust does considerable damage in Texas and in southern Louisiana. With the advent of crown rust resistant varieties it has been found that stem rust causes more damage than was formerly recognized.

Losses also have been caused by the oat smuts, although they have been kept under control in many sections by seed treatment with formaldehyde, Ceresan, and other standard disinfectants used for this purpose.

All these chemicals are more or less poisonous. Care should be taken to avoid inhaling the dusts, to wash the used utensils, and to dispose of surplus treated seeds and chemicals so that they will not be eaten by livestock or poultry.

Heavy smut infection has occurred most frequently in sections where strains of the highly susceptible Fulghum type oats have been grown.

In the more northerly parts of the common winter oat area, winter injury seriously damages the oat crop about 1 year in every 4 or 5. In this area only the more winter-hardy varieties should be used.

NEW CROWN RUST RESISTANT VARIETIES A BOON TO THE SOUTH

The introduction from South America and Australia in 1927 and 1929, respectively, by the United States Department of Agriculture, of the Victoria and Bond varieties of oats, highly resistant to crown rust and smut, marked the beginning of a new epoch in oat improvement in the United States. These have been crossed on standard varieties of the South, such as Fulghum, Fulgrain, Lee, and Red Rustproof (Appler, Nortex, Ferguson No. 922, and similar strains). Numerous selections from these crosses have been tested for disease resistance, yield, and quality by the Division of Cereal Crops and Diseases, Bureau of Plant Industry, Soils, and Agricultural Engineering, in cooperation with the many State agricultural experiment stations of the South. A practical accomplishment has been the production and distribution of several new varieties resistant to crown rust and smut and as winter hardy as the commonly grown varieties. Many workers have had a part in their development, and acknowledgment is here made of their contributions.

In the last year or two, selections from additional crosses have become available that resist stem rust as well as crown rust and smut, but these are not yet ready for distribution. This bulletin deals with the new varieties resistant to crown rust and smut that have been distributed to growers and, in addition, describes a few hardy winter

varieties that are not disease-resistant but are performing well on farms in the more northerly sections of the winter oat belt.

Common Winter Oats

The new common winter oat varieties are DeSoto, Lega, Lelina, Letoria, and Stanton (Strain 1). They represent a new type somewhat intermediate between common and red oats. All are resistant to most races of crown rust and smut and were originated from a

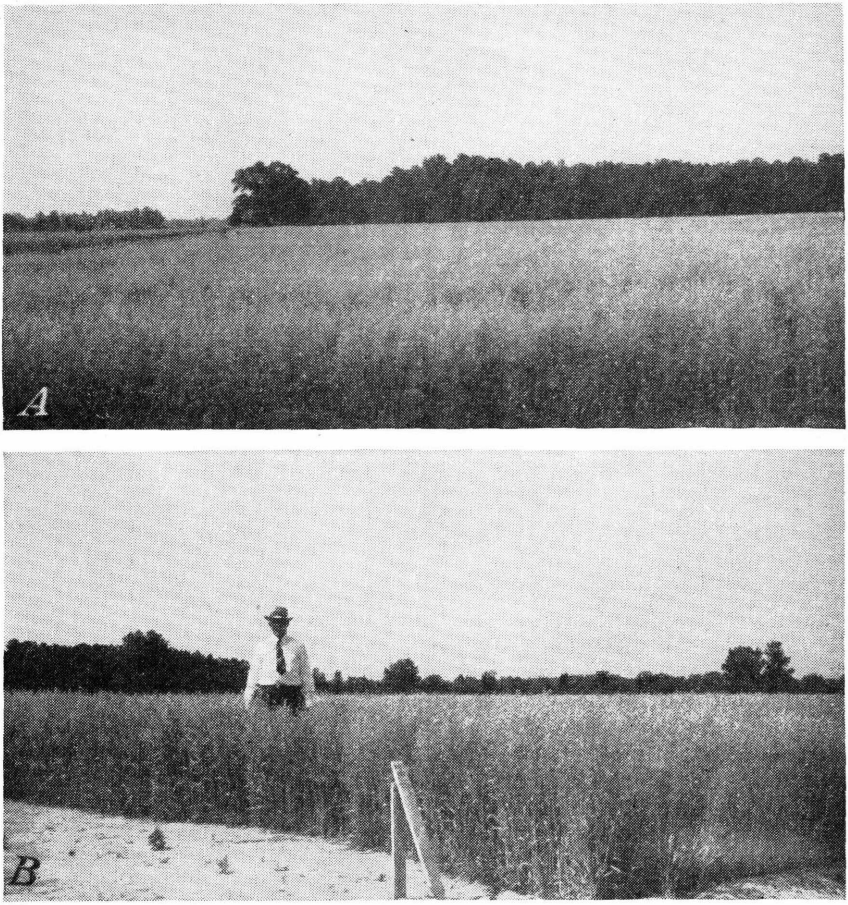

FIGURE 1.—*A*, Field of Letoria oats near Statesville, N. C.; *B*, field of Stanton oats near Hartsville, S. C.

cross between Lee and Victoria, made at Arlington Farm, Va., in 1931. Of all these varieties, Letoria and Stanton are generally adapted to the winter oat area and possibly are the most promising because of their greater winter hardiness. Letoria has been the most hardy of the five varieties named, with Stanton ranking second. All are vigorous and heavy tillering and have rather short, stiff straw and short, plump, yellowish to yellowish-red kernels.

DeSoto, distributed in the Grand Prairie section of Arkansas in 1942, was developed at the Rice Branch Station, at Stuttgart, a branch of the Arkansas Agricultural Experiment Station, in cooperation with the Bureau of Plant Industry, Soils, and Agricultural Engineering. The short straw of DeSoto should make it a favorite for combine harvesting. In tests at Stuttgart, DeSoto produced an 8-year average acre yield of about 65 bushels, compared with 58 bushels for Ferguson No. 922, the standard variety for that section, and with 41 bushels for Lee.

Lega was distributed from the Georgia Agricultural Experiment Station, at Experiment, where for 4 years it averaged about 8 bushels more an acre than the best standard Red Rustproof strains, as Appler, Hastings Hundred Bushel, and Terruf.

Lelina and Letoria were distributed from the Piedmont Branch Station of the North Carolina Agricultural Experiment Station, at Statesville (fig. 1, *A*). In tests at that station they compared favorably in yield with the productive but disease-susceptible Lee parent. At five localities in the Coastal Plain of North Carolina in 1941 and 1942, comparative average acre yields in bushels of several varieties were: Lee 77.1, Lelina 82.7, Letoria 88.5, Fulgrain 82.9, and Victorgrain 81.2.

Stanton (Strain 1) was distributed in the South in the fall of 1941 and has already become widely grown (fig. 1, *B*). Only limited data relating to comparable yields of Stanton and other varieties are now available from tests at experiment stations, but, where tested, it has been equal or superior to Lelina and Letoria. It has produced excellent yields on farms, except that it suffered somewhat from winterkilling in some of the more northerly sections of the winter oat belt in the severe winter of 1942–43.

Red Oats

Productive new red oat varieties that resist crown rust and smut are Fulgrain (Strain 4), Victorgrain, Fultex, Ranger, Rustler, Quincy 1, Quincy 2, and Camellia.

Fulgrain (Strain 4) and Victorgrain were developed and distributed at Hartsville, S. C., from a cross between Victoria and the original Fulgrain oat, which is susceptible to crown rust. Fulgrain (Strain 4) is a short-strawed, rather distinct variety. It is the earliest red oat ever grown commercially on an extensive scale in the South, and its earliness apparently has contributed much to its popularity. Victorgrain also is an early rather short-strawed, slightly hardier variety, ripening 5 to 6 days later than Fulgrain (Strain 4). Both varieties have been generally productive, considering their earliness, and have met with favor for combine harvesting.

Fultex is a short-strawed medium-early red oat with rather distinct yellowish-striped kernels and is resistant to many races of crown rust and smut. It was developed cooperatively by the Texas Agricultural Experiment Station and the Bureau of Plant Industry, Soils, and Agricultural Engineering at Substation No. 6, Denton, Tex., from a cross between Fulghum and Victoria made at Arlington Farm, Va., in 1930. Fultex has equaled the yield of Nortex only in years unfavorable for oats. Despite this handicap its short, stiff straw makes

it attractive to certain growers who prefer to sacrifice some yielding capacity in order to have a variety that after becoming fully ripe will stand well enough in the field to be harvested with a combine.

Ranger and Rustler were developed from a cross between Nortex and Victoria by the Texas Agricultural Experiment Station in cooperative experiments with the Bureau of Plant Industry, Soils, and Agricultural Engineering. The cross was made at Arlington Farm, Va., in 1930, and hybrid material was distributed to agricultural experiment stations of the South. These varieties are similar to the Nortex parent in most plant and kernel characters, but are resistant to crown rust and smut. Rustler ripens a little earlier under most conditions and does not grow quite so tall as Ranger. In 5-year yield tests at College Station, Tex., Ranger averaged about 10 bushels and Rustler about 2 bushels an acre more than the standard variety Nortex. Ranger and Rustler were distributed to growers in Texas in 1941 and in some parts of that State may eventually replace the older standard Red Rustproof strains, such as Ferguson No. 922 and Texas Red.

Quincy 1 and Quincy 2, developed at the North Florida Experiment Station, at Quincy, are new varieties with high resistance to crown rust and smut, and these varieties make oats a much more certain and valuable crop in northwestern Florida. Quincy 1 was selected from a cross between Kanota and Victoria made at Arlington Farm, Va., in 1930, and from it certain selections were first tested at Ames, Iowa, and then at Experiment, Ga., before being sent to Quincy for a more rigid test under the severe natural epidemics of crown rust that occur there almost every year (fig. 2). It is similar in many plant and grain characters to the Kanota (Fulghum) parent. The kernels are plump, reddish in color, and of a high test weight in favorable seasons. In maturity it is intermediate between Fulghum and Red Rustproof. Quincy 2 originated from a cross between a selection from a Victoria × Norton cross and Red Rustproof that was made by the Georgia Agricultural Experiment Station, at Experiment. Quincy 2 has a short straw, produces almost white kernels, and is somewhat intermediate in type between red and common oats. It is less promising than Quincy 1.

In experiments at Quincy, Fla., Quincy 1 and Quincy 2 outyielded the older varieties nearly every year because of their resistance to crown rust. There, as in southern Louisiana, resistance to crown rust determines the value of a variety. In some cases, Quincy 1, produced in northwestern Florida, has tested as high as 38 pounds to the bushel. Such high quality is most unusual for this section, where oats were considered a very uncertain crop until the new disease-resistant varieties became available.

Camellia (Louisiana 629) originated at the Louisiana Agricultural Experiment Station, at Baton Rouge, from a cross between Bond and Alber. This new oat, first distributed in 1941, is resistant to crown rust and has other desirable characters. The Bond-Alber cross was made at Arlington Farm, Va., in 1933, and seed was distributed to experiment stations of the South. Camellia has large, very plump, reddish kernels and produces a vigorous early growth that should make it valuable for winter grazing. In tests conducted at Baton Rouge it has been superior to the Alber parent, a South American variety of the Red Algerian type distributed from Baton Rouge sev-

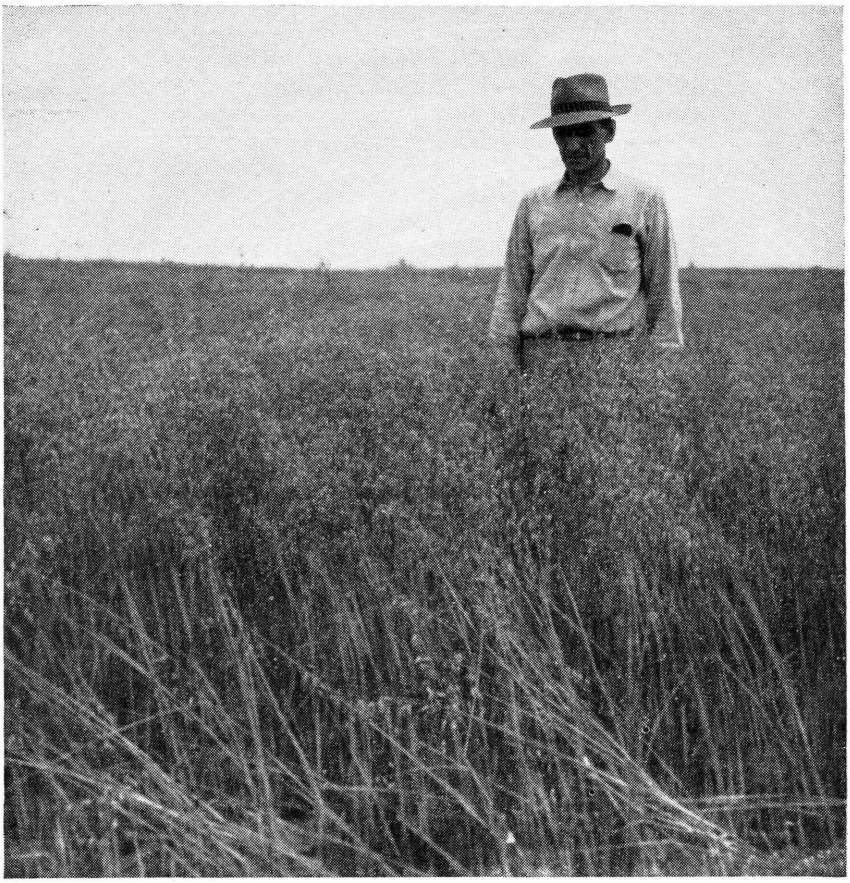

FIGURE 2.—Field of Quincy 1 oats in northwestern Florida.

eral years ago, as well as to the standard Red Rustproof strains. In extended tests for crown rust resistance conducted throughout the United States in 1942, Camellia was free from crown rust. In the same tests the Bond parent showed an average of only 0.6 percent infection, while highly susceptible varieties showed as much as 53 percent infection.

WINTER-HARDY VARIETIES FOR NORTHERN PART OF SOUTHERN OAT BELT

Common Winter Oats

Pioneer and Wintok are varieties of the common winter type selected and distributed by the New Jersey and Oklahoma Agricultural Experiment Stations, respectively. Neither variety is resistant to disease, but both are outstanding for winter hardiness and productiveness. Pioneer and Wintok originated from winter oat hybrid material sent to these experiment stations by the Bureau of Plant Industry, Soils, and Agricultural Engineering.

Red Oats

Several new red oat varieties that are not disease-resistant are attracting attention because of their winter hardiness and suitability for the more northerly parts of the fall-sown oat region. In these sections, resistance to cold is very important, but rust is less prevalent and damages the crop rather infrequently. Among these new varieties are Forkedeer, Fulwin, and Tennex, selected from Fulghum (winter type, selection C. I. 2499) at the Tennessee Agricultural Experiment Station at Knoxville. These three varieties are probably best classed as red oats. The original Fulghum selection C. I. 2499 originated at Arlington Farm, Va., in 1920, and was sent to the Tennessee station in the fall of 1929.

In a 5-year test at Knoxville, Fulwin and Tennex yielded 18 to 19 bushels (or 60 percent) more than Winter Turf. At the West Tennessee Experiment Station, at Jackson, the average yield for 2 years for these three varieties was 79.2, 80.0, and 45.4 bushels an acre, respectively. Although very susceptible to the rusts and smuts, they are among the few new hardy winter oat varieties that have become available in the United States in recent years.

VARIETIES RECOMMENDED FOR DIFFERENT SECTIONS

Southern New Jersey, Southern Maryland, the Eastern Shore of Maryland, and the Piedmont of Virginia

Letoria and the rust-susceptible hardy varieties Pioneer, Fulwin, and Tennex. Still hardier varieties are needed in these sections to reduce damage to the crop by freezing in severe winters.

Coastal Plain of Virginia and the Carolinas

Fulgrain (Strain 4) and Victorgrain as early varieties; Lelina, Letoria, and Stanton where somewhat later varieties are desired.

Piedmont of the Carolinas and Georgia

Letoria, Lelina, and Stanton. Fulgrain (Strain 4) and Victorgrain also do well, but are not hardy enough to withstand the occasional cold winters.

Central and Southern Georgia, Northwestern Florida, and the Gulf Coast of Alabama and Mississippi

Lega, Lelina, Fulgrain (Strain 4), Victorgrain, and Quincy 1. Quincy 2 and Stanton also are recommended where later oats are desired to spread the harvest season.

Central and Northern Alabama and Mississippi

Victorgrain, Fulgrain (Strain 4), and Fultex, all early short-strawed varieties suitable for combining. Stanton and Letoria are promising. The hardier Fulwin, Forkedeer, and Tennex also may be suitable for northern Mississippi.

Limited results indicate that such popular Red Rustproof strains as Appler, Ferguson No. 922, and Nortex, which usually escape serious rust damage, may be difficult to replace in many sections of Alabama and Mississippi.

Tennessee, Kentucky, and Southern Indiana

Fulwin, Forkedeer, Tennex, and probably Wintok. Of these, Forkedeer probably is preferable for western Tennessee and southern Indiana. So far, the lack of rust resistance of these varieties has not seriously interfered with their distribution and culture in these areas.

Arkansas

DeSoto is especially recommended for the Grand Prairie section. Letoria, Fulwin, and Tennex are of some promise for northwestern Arkansas, but may not be superior to the well-established Lee variety, which, like Fulwin and Tennex, is not resistant to the rusts.

Louisiana

Camellia and Alber for the southern part of the State; Alber, Ranger, and Rustler for the northern part, although the standard Red Rustproof strains also are well adapted there.

Texas

Ranger, Rustler, and Fultex, the latter for combining in north-central Texas. Nortex, New Nortex, and Ferguson No. 922, standard Red Rustproof strains, are popular varieties and may be difficult to replace in many sections, although they are rust-escaping only.

Oklahoma

Wintok appears to be generally well adapted to the more northerly sections of the winter oat belt, especially where winter hardiness is a prime requisite and the rusts are less prevalent, particularly on winter oats that mature earlier than spring oats.

GOOD PRACTICES

Crop to Follow

Ordinarily, winter oats are grown most advantageously in certain rotations with other crops. Where possible, they should follow a row crop, as cotton, corn, or soybeans, thus providing a winter cover. In addition they supply grain, provide some winter pasture, and serve as a companion crop for new legume seedings.

Preparation of Seedbed and Seeding

Oats respond well to good cultural methods. A moist, friable seedbed that is firm below and topped with 2 or 3 inches of loose, mellow soil is essential for prompt germination and the assurance of sufficient plant growth and root development before the advent of freezing weather. If the soil is firm it helps to prevent heaving of the plants in winter. Where fall-sown oats follow a row crop, plowing may be dispensed with if a satisfactory seedbed can be prepared by disking and harrowing. Usually an excellent seedbed for winter oats is obtained by disking soybean stubble, especially when the crop has been cut for hay.

Winter oats should be sown with a grain drill to insure complete and uniform depth of covering of the seed. The small five-hoe or disk drill commonly used in the South is satisfactory for sowing winter oats between cotton rows.

Fertilizers Necessary for Success

Fall-sown oats respond well to liberal applications of commercial fertilizers. One of the best fertilizer treatments is to apply 200 to 300 pounds of superphosphate at the time of seeding and to top-dress in February or early in March with 100 to 150 pounds of chemical nitrogen fertilizer, as nitrate of soda, ammonium sulfate, or some form of synthetic nitrogen. Owing to the demand for chemical nitrogen for making munitions, however, top dressing with these immediately available and highly efficient nitrogenous fertilizers may not be possible in many sections until the end of the war. Where available, a light winter top dressing of well-rotted manure may be substituted for the chemical nitrogen. An 0–14–7 fertilizer may be used instead of the superphosphate in sections where the application of potassium (potash) may be necessary, especially on the more sandy soil areas where available potassium is known to be deficient. Until nitrogen-containing fertilizers become more plentiful, an effort should be made to supply as much nitrogen as possible in the form of residues of soybeans, lespedezas, and other legumes.

Rate of Seeding

Rather heavy rates of seeding for winter oats usually are necessary to insure a satisfactory spring stand, especially in areas where winter-killing is likely to occur. As a rule, it pays to sow 8 to 10 pecks an acre, although in the milder parts of the South a 6-peck rate is frequently ample, especially when the oats are sown at the optimum date in a fertile, well-prepared soil.

Date of Seeding

One of the essentials for producing satisfactory crops of winter oats is early and timely seeding. Late seeding has been one of the most frequent causes of failure and of consequent discouragement with the crop. Winter oats should be sown early enough to give the young plants time to make sufficient growth to be well established before the occurrence of severe freezing weather. A good rule to follow in the northern half of the winter oat belt is to sow winter oats 3 to 4 weeks before the average date of the first killing frost

for the section. This is 3 to 4 weeks earlier than the best date for seeding wheat. For much of the Cotton Belt, best results are usually obtained by sowing not later than the last week of October. In the Gulf coast region, seeding may be delayed until November without too much risk.

Seed Treatment Essential

All winter oat seed should be cleaned and treated with New Improved Ceresan or some other standard fungicide for the control of the smuts, root rots, and seedling blights, regardless of whether the new varieties are resistant to smut. Even partial control only of the two latter diseases, which are little understood, will improve the vigor and yield of the crop. Seed treatment for oats is almost imperative if yields are to be satisfactory in the warm climate of the South, where many soil-borne organisms are present and very active.

Use Certified Seed

Seed from certified fields should be used when new disease-resistant varieties are being sown for the first time in a locality. This will assure an adequate seed supply of a reliable variety for the neighborhood in future years.

For sources of seed of the new varieties, the farmer should consult his local county agricultural agent or write to his State extension service or State agricultural experiment station. Seed in limited quantities of the new disease-resistant varieties should be available in many sections of the South by the fall of 1943 and in much greater quantities by the fall of 1944.

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